

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:	§	
Lowrance, et al.	§	
	§	Group Art Unit: 3689
Serial No.: 09/839,697	§	
	§	
Confirmation No.: 1784	§	
	§	Examiner: Tan D. Nguyen
Filed: April 20, 2001	§	
	§	
For: APPARATUS AND	§	
METHODS FOR	§	
GENERATING AND	§	
ACCESSING ARGUMENTS	§	

MAIL STOP AMENDMENT  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

**DECLARATION UNDER 37 C.F.R. § 1.131**

Dear Sir:

We, John D. Lowrance, Ian W. Harrison, and Andres C. Rodriguez, hereby declare as follows:

1. We are the inventors of the above-captioned patent application.
2. The invention of pending claims 1, 3-20, and 22-40 was conceived of prior to February 7, 2000, and filed with due diligence from prior to February 7, 2000, to filing of United States Provisional Patent Application Serial No. 60/232,186 on September 12, 2000, and to filing of the present application (which claims priority to Application Serial No. 60/232,186) on April 20, 2001.
3. Enclosed herewith in support of this declaration is an invention disclosure (Exhibit A) dated prior to February 7, 2000. Some information has been redacted.

We further declare that all statements made herein of our own knowledge are true and that all statements made on information and belief are believed to be true; and further, that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

  
John D. Lowrance

Mar. 16, 2009  
Date

\_\_\_\_\_  
Ian W. Harrison

\_\_\_\_\_  
Date

\_\_\_\_\_  
Andres C. Rodriguez

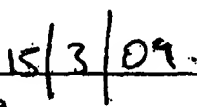
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Date

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John D. Lowrance

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Date

  
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Ian W. Harrison

  
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Date

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Andrés C. Rodríguez

\_\_\_\_\_  
Date

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John D. Lowrance

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Date

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Ian W. Harrison

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Date

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Andres C. Rodriguez

  
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Date



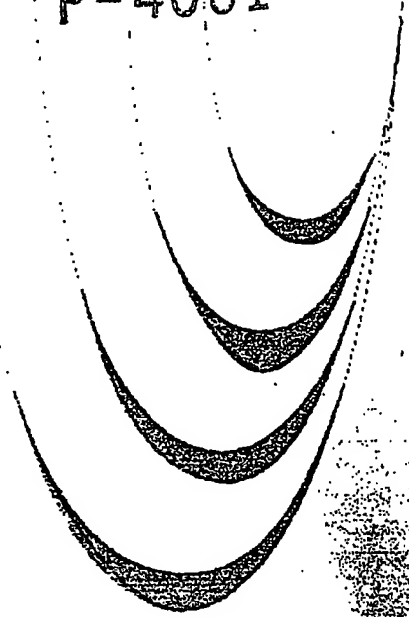
# The Future of Knowledge Management

EXHIBIT A

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*Tom Boyce*  
*Chief Knowledge Officer*

*Dr. John Lowrance*  
*Program Director, Artificial Intelligence Center*



# A Corporate Memory for Intelligence Analysis

- ▼ If we are to recognize future opportunities/crises, then we need to relate them to the opportunities/crises of the past
- ▼ We need to understand
  - How the current situation is like/unlike previous situations
  - How the indications and warning signs (I&W) are similar/dissimilar
  - How previous opportunities/crises were recognized or missed
  - How previous opportunities/crises evolved and thereby how the present situation might evolve
  - How previous situations were leveraged, mitigated, exacerbated, or missed
- ▼ We need a corporate memory of analytic products and methods
  - not just an historical data repository



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# DARPA's Project Genoa



is sponsoring the development of

- ▼ SEAS: SRI Early Alert System
- ▼ SEAS initial development sponsored by Statoil

- Early warning tool for project management
- Prototype application conceived and developed

- ▼ Development under Project Genoa

- Being generalized and applied to crisis warning for national security
- Multi-year effort
- Converting SEAS to a web-based client-server architecture
- Preliminary version completed
- Second version completed
- Final version



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# Themes for SEAS under Project Genoa



- ▼ Today, analytic products are recorded in text (a message, web page, or document) making them difficult to find, comprehend, compare, and explain
- ▼ We want to avoid the problems previously encountered when automated tools were developed to aid intelligence analysts
  - Reducing the analyst's role to that of data entry
  - Incomprehensible explanations and lines of reasoning
  - Analytic models that cannot be modified by the analysts
- ▼ Through *Structured Argumentation* we intend to aid analysts in developing, recording, communicating, explaining, and comparing analytic arguments
  - We are looking to facilitate the analyst's reasoning, not automate it



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# SEAS Concept of Operations

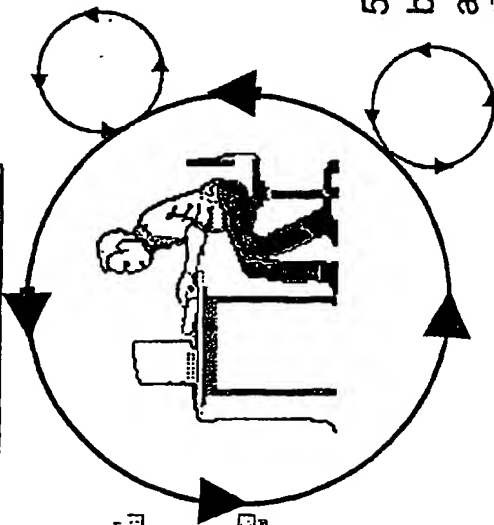
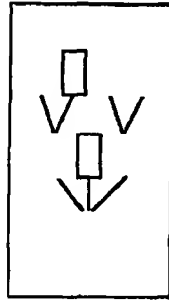
1. Categorize the current situation by choosing from a catalog of predefined types

2. Retrieve

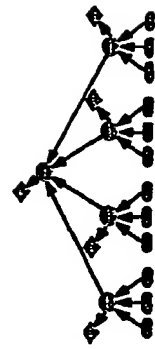
arguments produced by others to understand their thinking regarding this type of situation

3. Retrieve argument templates associated with this situation type for a checklist of specific questions

4. Record your answers to the argument's questions and attach supporting evidence



7. Create or modify argument templates and situation types



6. Publish your argument so that others can review your thinking

5. Unknown answers become information acquisition targets; invoke discovery tools from the template to find answers

Argument: ECONOMICCVA - NSI

Is the remedy aimed to solve a related economic crisis?

1 2 3 4 5

Does the remedy have any side effects? Is it necessary?

1 2 3 4 5

Does the remedy have any other benefits?

1 2 3 4 5

Is the remedy a good idea? Is it a necessary step?

1 2 3 4 5

Is the remedy a good idea? Is it a necessary step?

1 2 3 4 5

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# SEAS Query

- ▼ Previously developed arguments are indexed by different aspects of the situation to which they were applied
- ▼ Browsers aid the analyst in finding descriptive terms known to SEAS

**Query Parameters for Finding Objects:** P-4061

**clear**

Object Type:	<input type="checkbox"/> Argument	<input type="checkbox"/> Argument Template	
Dimensionality:	<input type="checkbox"/> Multidimensional	<input type="checkbox"/> Unidimensional	
Perspective:	<input type="checkbox"/>		
Situation Actor:	<input type="checkbox"/>	NATION-STATE-ACTOR	
Situation Region:	<input type="checkbox"/>	Iraq	
Situation Event:	<input type="checkbox"/>	CIVIL-UNREST	
Situation Start date (dd mm yyyy)			
Occurs After:	<input type="checkbox"/>	15	1999
Occurs Before:	<input type="checkbox"/>	1	1
Author:	<input type="checkbox"/>	Howrance	
Publisher:	<input type="checkbox"/>		
Date Published (dd mm yyyy)			
Published After:	<input type="checkbox"/>	1	1
Published Before:	<input type="checkbox"/>	1	1

Query Parameters

←

→

Browse Buttons

→

→



# SEAS Multidimensional Argument Conclusion

▼ A multidimensional argument consist of several coordinated assessments along different perspectives

▼ These are conveniently displayed in a "starburst" plot

- each axis of the starburst corresponds to a different unidimensional argument
- the light corresponding to the result for each factor is plotted along the probability scale with the origin at the center of the plot
- the lights are connected to form a polygon that visually summarizes the overall result
- drill down is directly supported by clicking on a factor

RED = Warning  
Green = Warning

Environmental



Economic



Social



External



Political



Military



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# SEAS Uidimensional Argument Conclusion

- ▼ A unidimensional argument records one analytic perspective
- ▼ In this 1x3 argument, the overall conclusion is supported by four intermediate conclusions

Argument: ECONOMIC.CSA - NS.1

Overall Question & Conclusion

Is the country about to enter a serious economic crisis?

Does the nation face acute instability in the real economy?

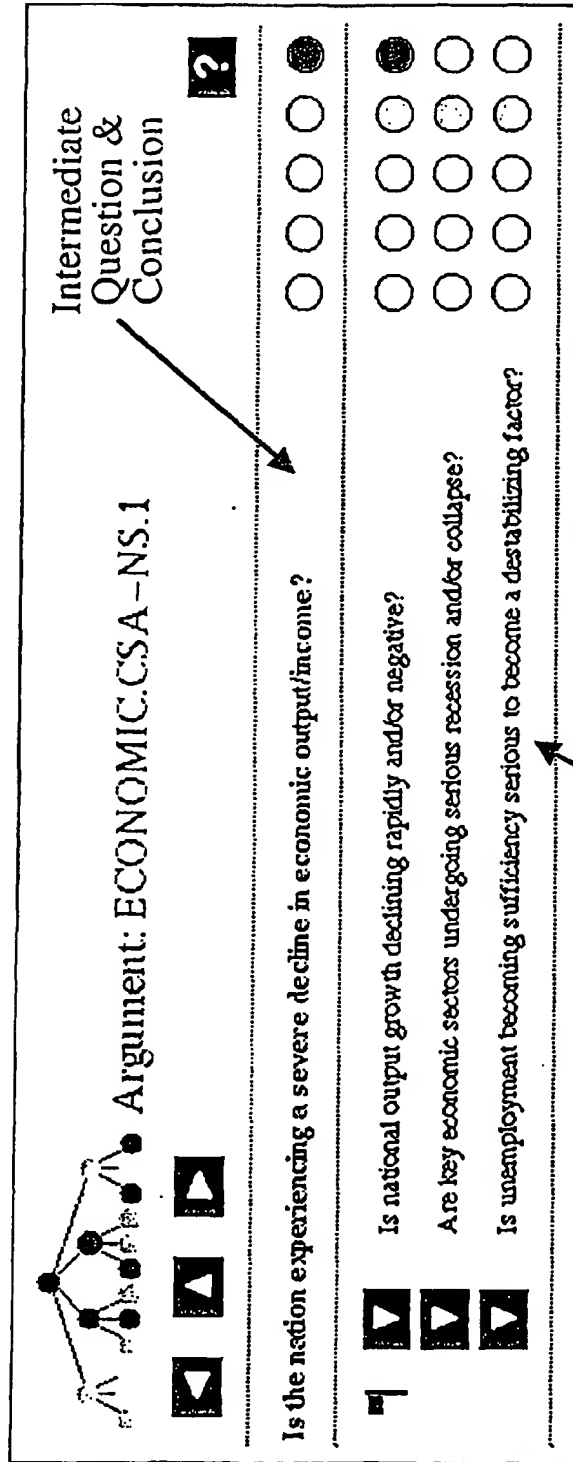
Does the nation face acute financial instability?

Is the nation experiencing a severe decline in economic output/income?

Is there a critical breakdown in economic infrastructure?

# SEAS Intermediate Conclusion

- ▼ This intermediate conclusion is supported by three input questions/conclusions



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Input Questions/  
Conclusions



# SEAS Input Question/Conclusion

## Multiple-choice question

- answered directly by the user

## Rationale

- Reason the user answered as they did

## Documentary Evidence

- Documents whose relevance to the question has been recorded

## Exhibits

- Documents that are potentially relevant to answering the question



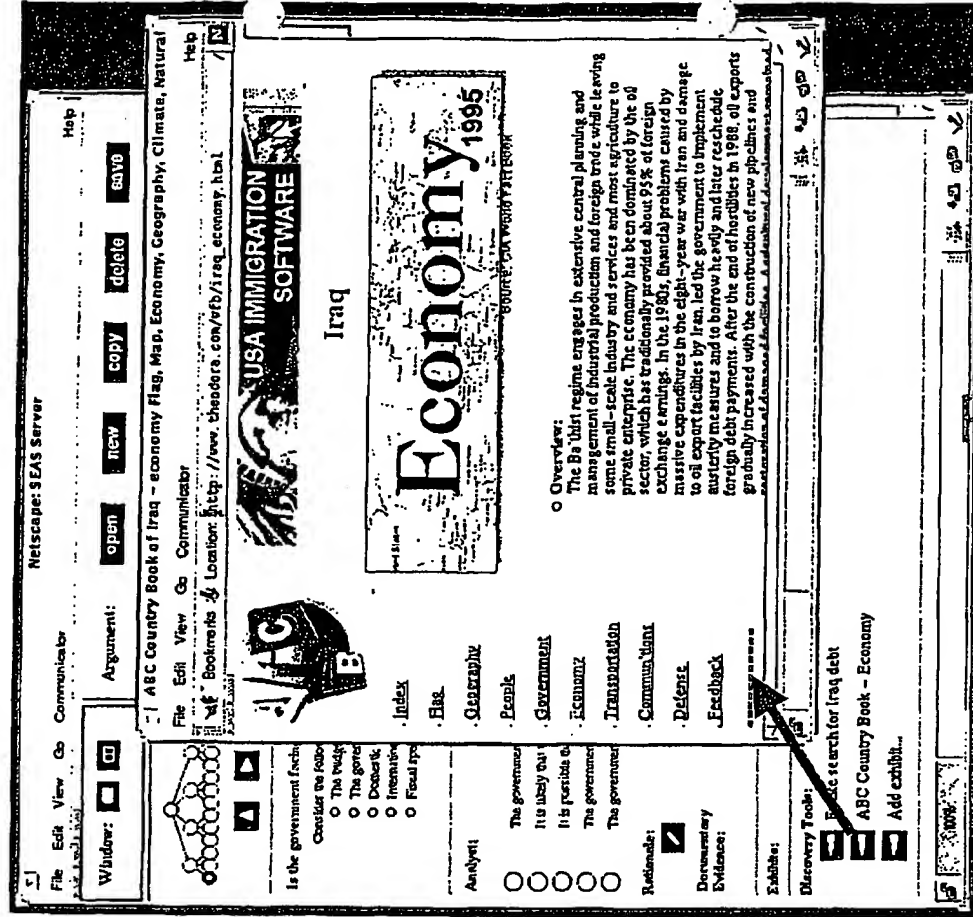
<b>Argument: ECONOMIC.CSA-NS.1</b>			
<b>Is national output growth declining rapidly and/or negative?</b> Consider the following examples: <input type="radio"/> GDP growth rates (quarterly/annually) indicate substantially declining output growth. <input type="radio"/> GDP per capita growth rates indicate declines. <input type="radio"/> Rates of investment are unusually low and/or negative.		<b>Question with Amplification</b>	
<b>Analyst:</b> John Lowrance, SRI International	<b>Date:</b> 11:09 5/17/1999	<b>Multiple-choice Answers</b>	
<input type="radio"/> National output is growing at a good or normal pace. <input type="radio"/> It is unlikely that the output growth rate will fall rapidly. <input type="radio"/> It is possible that the output growth rate will fall rapidly. <input type="radio"/> It is likely that the output growth rate will fall rapidly. <input checked="" type="radio"/> It is highly likely that the output growth rate will fall rapidly		<b>Rationale</b>	
<b>Rationale:</b> <input checked="" type="checkbox"/> The GDP has a history of instability as evidenced by the HIES table referenced below.		<b>Documentary Evidence</b>	
<b>Documentary Evidence:</b> <input checked="" type="checkbox"/> <i>Handbook of International Economic Statistics, 1997, Table 9: GDP per Capita</i> <input checked="" type="checkbox"/> <i>Wall Street Journal, March 13, 1999</i> The GDP is shown to have been unstable during the mid to late 1990s.		<b>Exhibit</b>	
<b>Exhibits:</b> <input checked="" type="checkbox"/> <i>Wall Street Journal, March 13, 1999</i>		<b>Discovery Tools:</b> <input checked="" type="checkbox"/> add exhibit...	

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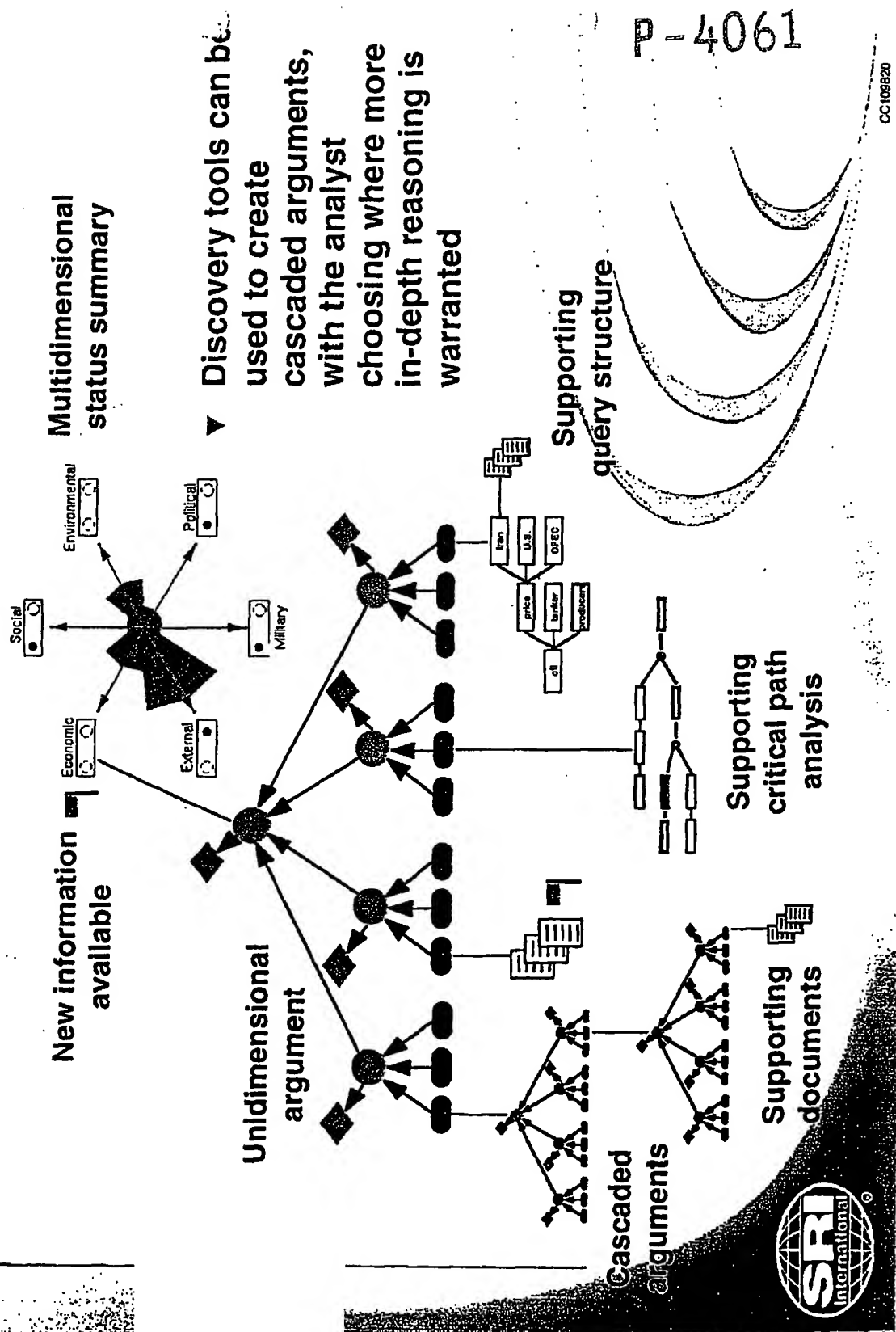
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# Discovery Tools

- ▼ Parameterized queries/tools launched from SEAS arguments to acquire information relevant to a SEAS question
- ▼ Asynchronously produced results are deposited as exhibits into SEAS arguments
- ▼ Newly discovered results are signaled by "mail flags"



# Cascaded Arguments





# Situation Descriptors

- ▼ Situation descriptors are associated with each argument
- ▼ They record aspects of the situation for which the argument was developed
- ▼ They are the basis for queries against corporate memory

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**Situation Descriptor for Argument IRAQ-99**

**save** **reset** **exit** **?**

<b>Perspective</b>	I		
<b>Time Interval</b>	I	to	I
	(format is dd-mm-yyyy)		
<b>Actor</b>	Nation-State-Actor		
<b>Actor Description</b>	I		
<b>Region</b>	Iraq		
<b>Event</b>	Civil-Unrest		
<b>Event Description</b>	Student demonstrations outside government buildings		
<b>Comments and Assumptions</b>	I		



# Argument Publishing

- ▶ Published arguments are guaranteed to be both stable and persistent
- ▶ Access control:
  - The audience has read access
  - The authors have write access, while unpublished, & read access thereafter

##UNPUBLISHED## Argument CSA-NS.LOWRANCE

☐ Author ☐ Lowrance Harrison ☐ save ☐ publish ☐ exit ☐ ?

☐ Audience ☐ SCOPE-TERM

Propagate Components? |


<input type="checkbox"/>	ENVIRONMENTAL CSA-NS.LOWRANCE (by LOWRANCE HARRISON)	<input type="checkbox"/>
<input type="checkbox"/>	SOCIAL CSA-NS.LOWRANCE (by LOWRANCE HARRISON)	<input type="checkbox"/>
<input type="checkbox"/>	POLITICAL CSA-NS.LOWRANCE (by LOWRANCE HARRISON)	<input type="checkbox"/>
<input type="checkbox"/>	MILITARY CSA-NS.LOWRANCE (by LOWRANCE HARRISON)	<input type="checkbox"/>
<input type="checkbox"/>	EXTERNAL CSA-NS.LOWRANCE (by LOWRANCE HARRISON)	<input type="checkbox"/>
<input type="checkbox"/>	ECONOMIC CSA-NS.LOWRANCE (by LOWRANCE HARRISON)	<input type="checkbox"/>

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# Argument Templates Editing



Template: NEW-ECO

◀ ▶ save reset ?

Base question:

Is the domestic banking/financial system experiencing serious strain?

Amplification examples:

There is an unusual rise in bank failures (numbers and/or size of banks). -Banks are calling in loans

Answers:

☒ There is no evidence suggesting banking/financial system strain.

☐ The banking/financial system is experiencing some new problems.

☐ The banking/financial system may encounter serious strains.

☐ It is likely that the banking/financial system will encounter serious strains.

☒ It is highly likely that the banking/financial system will encounter serious strains

▼ Argument templates are edited and published much like arguments

▼ SEAS emphasizes the use of simple and regular inference structures

- making it possible for analysts to author new templates by writing questions/answers that fit the selected inference structure.

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# What kinds of argument templates are anticipated?

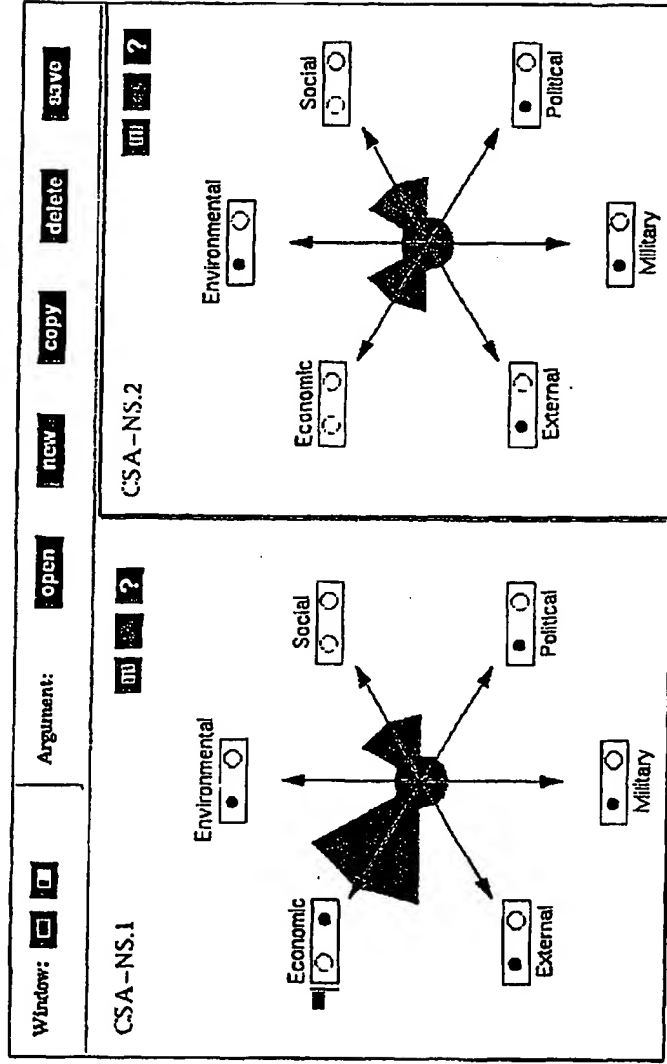
- ▼ Abstract/general ones to fall back on when appropriate concrete/specialized ones are unavailable
  - These remind the analyst to consider a broad range of factors
  - These provide a basic structure on which to hang an argument
- ▼ Concrete ones that address more specific questions
  - Abstract templates will tend to be supported by more concrete templates, in the form of discovery tools
  - These provide strong guidance in how to address specific analytic tasks
- ▼ Specialized ones that are applicable within a limited context
  - Specialized templates will tend to ask more specific questions since more is known about the context
  - E.g., restricted to specific parts of the world, types of countries, specific times

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# SEAS Comparative Viewer



▼ Supports the rapid comparison of arguments pertaining to

- Different situations
- The same situation assessed by different analysts
- The same situation at different times



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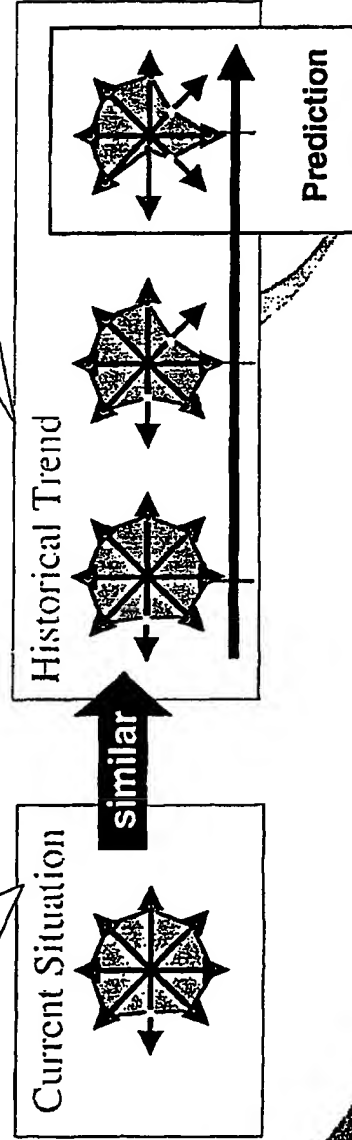
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# Argument Mining & Trend Analysis

- ▼ Qualitative methods for argument/situation description and indexing support
  - Mining to discover important relationships
  - Prediction based upon similarities to historical trends

• Inflation is on the rise  
• Budget is nearing crisis  
• Confidence in government is dropping

• Hyperinflation  
• Led to decline in employment  
• Led to economic collapse  
• Resulted in government's overthrow



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# SEAS Architecture

## ▼ SEAS consists of

- Three distinct servers
- Each utilizing an industry standard interface
- Each can be hosted on a different or all on a common machine

### SEAS Server

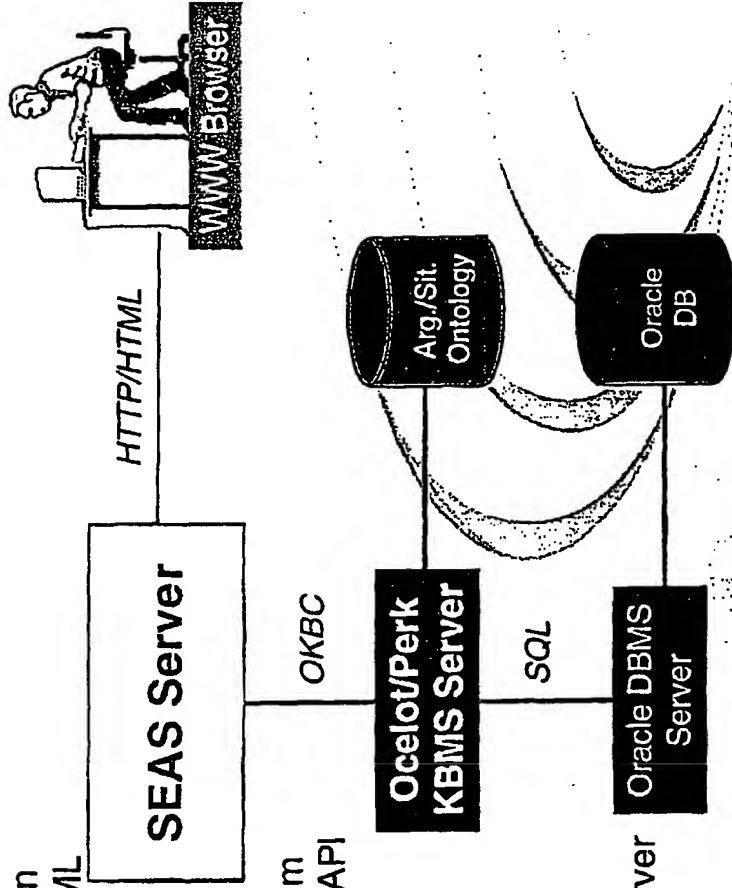
- A web server that takes in HTTP and produces HTML
- It connects to the KBMS Server via OKBC

### Ocelot/Perk KBMS

- A KB management system server with OKBC as its API
- It connects to the DB Server via SQL

### Oracle DBMS

- The industry standard Oracle data base management system server



# Key Features of SEAS

## ▼ Argument Templates

- Structured sets of interrelated questions that capture analytic methods
- Include (Discovery Tools) embedded methods for obtaining information relevant to the template questions

## ▼ Arguments

- Filled out templates including
  - Answers to questions with statements of rationale
  - Supporting documentary evidence with statements of relevance

## ▼ Corporate Memory

- Knowledge base of arguments, templates, and situations
- Augmented by analysts using SEAS

## ▼ SEAS Capabilities

- Arguments & templates record analytic products and methods
- Structured arguments are easily communicated, explained, and compared
- Structured arguments allow the user to quickly "drill down" through alternative arguments to discover what is different and what supports that difference
- Templates structure and guide analytic thinking encouraging higher fidelity reasoning
- Cascaded templates support deeper reasoning where the analyst determines that it is desirable



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# Key Benefits of SRI's Early Alert System

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- ▼ Captures human views and uncertainty explicitly
- ▼ Allows integration of disparate source of information
- ▼ Easy to use
- ▼ Web-based
- ▼ Graphic display of results
- ▼ Builds and exploits a corporate memory



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